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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/849,724	05/20/2004	Tetsuya Takiguchi	JP920030128US1	8657

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On behalf of IBM CORPORATION
Anne Vachon Dougherty, Esq.
3173 Cedar Road
Yorktown Heights, NY 10598

EXAMINER	
VO, HUYEN X	

ART UNIT	PAPER NUMBER
2626	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/849,724	TAKIGUCHI ET AL.	
	Examiner	Art Unit	
	HUYEN X. VO	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 July 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7-12 and 14-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7-10,12,15 and 16* is/are rejected.

7)☒ Claim(s) *11 and 14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 May 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 7/16/2008 have been fully considered but they are not persuasive. Komori et al. disclose a method of and system for adapting speech models using noise extracted during silence periods in the speech signal (*the operation of figure 2*). The only feature that Komori et al. lacks is using “speech echo” instead of noise to adapt speech models. However, Takiguchi was relied upon for the teaching of using “reverberant speech” to adapt speech models (page 128, left column). And since “reverberant speech” is considered the same as "echo speech", it would have been obvious to one of ordinary skill in the art at the time of invention to modify Komori et al. by incorporate the teaching Takiguchi. In fact, the system of Komori et al. would inherently be able to adapt speech models with any available type of adaptive signal, whether it is noise or echo speech, as long as adaptive signal is available for adaptation.

2. Instead of using noise to generate noise model for adapting speech models, Takiguchi et al. teach using "reverberant speech" to adapt speech models. Therefore, the combination of Komori et al. and Takiguchi would teach all the claimed limitations including generating “echo speech model”, “adding the echo speech model” to adapt speech models.

3. In response to applicant's arguments regarding Komori et al. fail to disclose/suggest "a storage area for storing a feature quantity acquired from a speech signal for each frame storing portions for storing acoustic model data and language model data, respectively", as explained in previous office action that any computing system inherently includes buffer memory and storage memory for handling the input speech signal for processing by the system. Sound card inherently includes memory and/or buffer memory (*sound analysis section 102 in figure 2 inherently includes a buffer memory for temporarily storing the received speech signal for processing*). In fact, before speech recognition operation, speech features must first be extracted from received speech, and are preserved or stored for further processing in matching or comparing with speech models to determine a best match (*referring to elements 203 and 105 in figure 1, speech HMM 4; language model or grammar or dictionary*).

Claim Objections

4. Newly added limitations in claim 7 needs clarification. The clean speech models are already existed in the speech recognition system. It is not clear why the speech models are generated again and from what it is generated from. In this office action, examiner treated the step of "generating a speech model" as accessing speech models in the speech recognition system for adaptation.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The newly added limitation regarding “generating a speech model” is not clear. The clean speech models are already existed in the speech recognition system. It is not clear why the speech model is generated again and from what it is generated from. Claim 7 needs clarification.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 7 recites the limitation "said storing portion" in line 7. There is insufficient antecedent basis for this limitation in the claim.

9. Claim 8 recites the limitation "said sum" in line 6-7. There is insufficient antecedent basis for this limitation in the claim.

10. Claim 12 recites the limitation "said storing portion" in line 7. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 7-10, 12, and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komori et al. (US 5956679) in view of Takiguchi et al. (IEEE Publication).

13. Regarding claim 7, Komori et al. disclose a speech recognition method for causing a speech recognition device configured to include a computer to perform speech recognition the method causing the speech recognition device to execute the steps of:

storing in a storage area a feature quantity acquired from a current speech signal for each frame (*sound analysis section 102 in figure 1 inherently includes a buffer memory for temporarily storing the received speech signal for further processing; also referring to col. 5, lines 22-32*);

reading from a storage portion a noise signal acquired immediately prior to the current speech signal to be processed at the current time point to generate noise model data (*steps 401-402 in figure 2; noise intervals are extracted from the input speech signal and is processed in step 401 in figure 2; the sound analysis section 102 in figure*

1 inherently includes a buffer memory for temporarily storing the noise for further processing by steps 401-402 in figure 2; also referring to col. 5, lines 49-57);

processing a speech model stored in a storing portion using a noise adaptation model generation portion for generating noise model data from a noise signal acquired immediately prior to the current speech signal to be processed at the current time point (*step 402 in figure 2 generating noise HMM from the noise intervals extracted from the input speech signal*);

generating a speech model affected by intra-frame echo influence using acoustic model data and an intra-frame characteristic (*treated as accessing clean speech models; step 203 in figure 2*);

adding the noise model data to the speech model affected by intra-frame echo influence to generate an adapted acoustic speech model data and store it in a storage area (*step 403 in figure 2; adapting speech models using noise model; or referring to the operation of figure 7; adding noise model to the clean speech model to generate adaptive speech models*); and

processing said feature quantity, said adapted acoustic model data, and language model data stored in a storing portion to generate a speech recognition result of the current speech signal (*recognition process in steps 303-305 and 104-106 in fig 2*).

Komori et al. fail to specifically disclose an “echo speech” in place of noise. However, Takiguchi et al. teach “echo speech” (*page 128, left column, “reverberant speech” is considered the same as an "echo speech"*).

Since Komori et al. and Takiguchi et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Komori et al. by incorporating the teaching of Takiguchi et al. in order to improve speech recognition accuracy.

14. Regarding claim 12, Komori et al. disclose a computer-readable program embodied in a computer readable storage medium for causing a computer to execute the speech recognition method comprising the steps of:

storing in a storage area a feature quantity acquired from a current speech signal for each frame (*sound analysis section 102 in figure 1 inherently includes a buffer memory for temporarily storing the received speech signal for further processing; also referring to col. 5, lines 22-32*);

reading from a storage portion a noise signal acquired immediately prior to the current speech signal to be processed at the current time point to generate noise model data (*steps 401-402 in figure 2; noise intervals are extracted from the input speech signal and is processed in step 401 in figure 2; the sound analysis section 102 in figure 1 inherently includes a buffer memory for temporarily storing the noise for further processing by steps 401-402 in figure 2; also referring to col. 5, lines 49-57*);

processing a speech model stored in a storing portion using a noise adaptation model generation portion for generating noise model data from a noise signal acquired immediately prior to the current speech signal to be processed at the current time point

(*step 402 in figure 2 generating noise HMM from the noise intervals extracted from the input speech signal*);

processing a speech model stored in a storing portion using an echo adaptation model generation portion for generating echo speech model data from a speech signal acquired immediately prior to the current speech signal to be processed at the current time point (*step 402 in figure 2 generating noise HMM from the noise intervals extracted from the input speech signal*) and using a noise model data to generate adapted acoustic speech model data and store it in a storage area (*step 403 in figure 2; adapting speech models using noise model; or referring to the operation of figure 7; adding noise model to the clean speech model to generate adaptive speech models; the adaptive models are inherently preserved or stored for the recognition step*);

processing said feature quantity, said adapted acoustic model data, and language model data stored in a storing portion to generate a speech recognition result of the current speech signal (*recognition process in steps 303-305 and 104-106 in fig 2*).

Komori et al. fail to specifically disclose an “echo speech” in place of noise. However, Takiguchi et al. teach “echo speech” (*page 128, left column, “reverberant speech” is considered the same as an "echo speech"*).

Since Komori et al. and Takiguchi et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Komori et al. by incorporating the teaching of Takiguchi et al. in order to improve speech recognition accuracy.

15. Regarding claim 8, Komori et al. further disclose the speech recognition method according to claim 7, wherein the step of generating said adapted acoustic model data further comprises the step of: a model data area transforming portion reading sum calculated by said adding portion (*figure 7, transformation form HMM to linear*); and transforming cepstrum acoustic model data into linear spectrum acoustic model data (*referring to figure 7*).

16. Regarding claim 9, Komori et al. further disclose the speech recognition method according to claim 8, further comprising a step of: causing an adding portion to read and add said linear spectrum acoustic model data and said echo speech model data to generate a maximum likelihood echo prediction coefficient (*referring to figure 7; adding noise model to clean speech model*).

17. Regarding claim 10, Komori et al. fail to specifically disclose the speech recognition method according to claim 9 wherein the step of transformation into said linear spectrum acoustic model data comprises a step of causing said adding portion to add the cepstrum acoustic model data of said acoustic model and cepstrum acoustic model data of an intra-frame transfer characteristic to generate the speech model affected by intra-frame echo influence. However, Takiguchi et al. teach the step of causing said adding portion to add the cepstrum acoustic model data of said acoustic model and cepstrum acoustic model data of an intra-frame transfer characteristic to

generate the speech model affected by intra-frame echo influence (*referring to figure 3 or equation 7 on page 129*).

Since Komori et al. and Takiguchi et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Komori et al. by incorporating the teaching of Takiguchi et al. in order to improve speech recognition accuracy.

18. Regarding claim 15, Komori et al. further disclose the speech recognition method according to claim 7 wherein said storing comprises steps of: transforming a received current speech signal into a digital signal (*A/D converter 101b in figure 1*); and storing the transformed signal with amplitude associated with at time frame (*inherently included in the sound analysis section 102 in figure 2 since features extracted from the input speech includes frequency domain features*).

19. Regarding claim 16, Komori et al. further disclose the speech recognition method according to claim 9 wherein said echo prediction coefficient is calculated for at least one of a particular signal receiving device, a level of recognition efficiency, a level of recognition speed, and each state of a Hidden Markov Model (*noise HMM models in figure 2 derived from noise features including spectral features*).

Allowable Subject Matter

20. Claim 11 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUYEN X. VO whose telephone number is (571)272-7631. The examiner can normally be reached on M-F, 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on 571-272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Huyen X Vo/ 10/20/2008
Primary Examiner, Art Unit 2626

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